be determined, whilst the point at which an input operation has effect is limited only by the resolution of the display and the point at which active elements become too small to be comfortably visible. The point of contact of the finger and the touch pad can be calculated for instance from a set of matrix points covered by the finger to a greater resolution than that of the matrix itself.

BRIEF DESCRIPTION OF THE DRAWINGS

[0015] A personal digital assistant embodying the invention will now be described, by way of non-limiting example, with reference to the accompanying diagrammatic drawings, in which:

[0016] **FIG. 1** is a schematic diagram showing an electronic device having a tactile display;

[0017] **FIG. 2** shows a personal digital assistant having a graphical user interface;

[0018] **FIG. 3** illustrates the cursor geometry in the user interface of **FIG. 2**;

[0019] **FIG. 4** is a flow diagram showing the operation of the user interface.

BEST MODE OF CARRYING OUT THE INVENTION

[0020] **FIG. 1** shows in schematic form an electronic device according to an embodiment of the invention. A touchpad input device **100** for instance of the resistive type sold under the TouchTek4 brand by MicroTouch Systems, Inc. provides input via a suitable controller (not shown) to a computing device **110** that requires input. Computer **110** is connected to a display device **120**, of any suitable type such as an LCD display.

[0021] As is well known, touchpad input devices are small, touch-sensitive devices that can be used as a pointing device to replace a mouse, trackball or other cursor locator/input device in mouse-driven or other personal computers. The touchpad typically includes a small touch-sensitive screen up to 3" by 5" in size and produces X, Y location coordinates representative of the location of the touching device (finger or inanimate object such as stylus) on its surface. The computer **110** interprets these X,Y coordinates to locate the cursor on the computer display. The user controls the computer cursor location by moving their finger across the sensor surface. Touch pad **100** is transparent and physically overlies the display device **120**.

[0022] One example of a device with this general structure is the personal digital assistant **200** shown in **FIG. 2**. PDA **200** comprises a touch sensitive display **220**, incorporating touch pad **100** and display **120**. A user interface is displayed on display **220** in order to allow a user to effect input operations according to the position of a cursor **240** in relation to a displayed image having active elements that are in general smaller than the finger, such as the images of the keys of a keyboard illustrated at **250**. Such active elements may of course also include icons, scroll bars, dates on a calendar, characters in a document or the like.

[0023] As can be seen in **FIG. 2**, the position of the cursor on the displayed image is displaced by a short distance—around 5 mm for instance in preferred embodiments—from the point of contact of the finger **230** with the display so that the position of the cursor when an input operation is effected is visible to the user. This displacement can be set by the user according to their preference and the size of their finger.

[0024] **FIG. 3** is a schematic diagram that shows the geometrical relationship between cursor **240** and zones on contact **270** between and finger and touch screen at an initial location D**0** and locations of first and second finger taps D**1** and D**2** respectively.

[0025] It will be appreciated that with this displacement between the point of contact that the position of cursor **240**, there is a zone—denoted **260** in **FIG. 2**—at the bottom of the touchpad into which the cursor cannot be moved. This zone can either be used to display nonactive elements, such as a date and time, or the device can be arranged so that the touchpad is slightly larger in this dimension than the underlying display surface. A similar zone **261** exists at the top of the screen where detection of the point of contact of a finger is unnecessary.

[0026] **FIG. 4** shows in section an embodiment in which touchpad **100** and display screen **120** are laterally displaced one from another to create zones **260** and **261**.

[0027] **FIG. 5** is a flow diagram showing an operating process operated by the graphical user interface software that controls display **220** in this embodiment. In applications to PDA this would be incorporated in the operating system of the device. The process starts at step **300** when a finger **230** touches the screen. Detection of the finger in contact with the screen for greater than a threshold time—for instance 0.3 s—causes cursor **240** to be displayed on the screen. This time threshold is designed to filter accidental touches. A user can then cause the cursor to move on the screen by moving their finger.

[0028] Once the user has positioned cursor **240** in a desired location—denoted S in **FIG. 3** and **4**, overlying for instance a chosen key in keyboard **250**, a chosen icon or other active display element, the user taps the display twice in relatively quick succession at that location. The first finger tap **310** serves to fix the position of the cursor and the second finger tap **320** serves to confirm the position of the cursor as the point of effect desired by the user.

[0029] First a check is carried out to check whether the first tap is spatially associated with the cursor position decision step **330**. If D**0**-D**1** is less than a threshold distance Dm, where D**0** is the position of the last contact point that determined the cursor location and D**1** is the point of contact of the first tap, then the position of the cursor is defined as the position S of the last contact point. The distance Dm is preferably settable for optimal performance, but would typically be set at around 3 mm. If D**0**-D**1** is greater than the threshold Dm then the cursor is simply moved to the position S**1** of the first tap—step **350**.

[0030] Next the temporal association of the two taps is determined in step **340**—if the time elapsed t**2**-t**1** between the two taps is less than a settable threshold Tm then the input operation associated with whatever active element is located under the cursor is carried out. The time Tm can be set by the user for optimal performance, but could be set to around 0.2 s, for instance.

[0031] If t**2**-t**1** is greater than tm a check is carried out to see if the taps are in the same location—decision step **350**